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THE EFFECT OF TIME INTERVALS IN RUBBER TAPPING.

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DEPARTMENT OF AGRICULTURE, CEYLON.

BULLETIN No. 42.

THE EFFECT OF TIME INTERVALS IN RUBBER TAPPING.

By T. Petch, B.A., B.Sc.

THE time interval in rubber tapping is the period which elapses between successive re-openings of the same cut. In the early days of rubber cultivation this varied from eight hours upwards, but in ordinary estate practice at the present day it is one, two, or three days. Many experiments have been carried out on this point, and the majority of them have demonstrated that the yield per tapping increases as the time interval is increased, at least up to four or five days, but that the greatest quantity of rubber is obtained by the most frequent tapping.

It may be noted that these experiments only illustrate the differences in the yield obtained by tapping at different intervals, and several other factors must be taken into consideration in deciding which is the best system for estate work in general. There is, for example, the question of the effect of the tapping on the tree, more especially as regards the character of the renewed bark. There is also the economic factor, when the price of rubber is low, of the return per unit of labour.

All the recorded experiments on this point suffer from the disadvantage that the trees were tapped by systems which have since been abandoned in estate practice. To be of any value, such experiments must be continued for several years, and by the time they have been concluded, the system on which the trees were tapped has become out of date. The Henaratgoda experiments, for example, were begun in 1908,

and the trees were tapped with three cuts on half the circumference, a system which appeared conservative when compared with the usual estate method then in vogue of six cuts on the same fraction of the circumference. Similarly, the present series, begun in 1912, was conservative, according to the ideas then current, in that the tapping was four cuts on one-third, but to be in agreement with estate practice at the present day, the trees should have been tapped with one cut only. It does not, however, appear probable that the results of these experiments would be reversed, if only one cut were tapped.

The experiment here recorded was instituted by the late Dr. Lock on the Experiment Station, Gangaruwa, in July, 1912, on three rows of trees: 82 B, 78 A, 78 B. The trees were then seven years old, and were planted 15 feet by 15 feet.

Plot 78 (1 acre) had been manured in 1909 and 1910 with 150 lb. sulphate of ammonia, 100 lb. conc. superphosphate, and 100 lb. sulphate of potash per annum.

Plot 82 had been interplanted with *Crotalaria striata* as a green manure in 1909.

On plot 78 44 trees of row A had been previously tapped full-herring bone on half circumference, and 50 trees of row B half-herring bone on half circumference, from January to December, 1910. Tapping was confined to half the circumference, and in the majority of cases to one or two cuts only. The trees were then rested until July, 1912.

On row 82 B tapping on one-third the circumference had been begun on 39 trees in October, 1910, and was continued until December, 1913. Consequently, when the experiment on time intervals was begun, this row had been in tapping nearly two years. The experiment may be said to have been based on this row, the other two being added. Tapping during July–November, 1912, on 82 B was on the second half of the second third, and in the following year on the remaining third.

According to the plan of the experiment, all the tapping was to be on one-third of the circumference, with four cuts to the left, one foot apart. The old tapping on the second third of 82 B had been with from three to five cuts to the right, and this was continued for five months until the section was finished. Unfortunately, owing no doubt to the departure of the officer who planned the experiment, the third section was tapped with three cuts to the right, instead of four cuts to the left.

From January, 1914, a new row, 80 C, was substituted for 82 B. This row had not been previously tapped.

Rows 82 B and 80 C were tapped three times per week; row 78 A twice per week; and row 78 B once per week. By some error on the part of the officer then in charge of the experiments, 80 C was tapped during 1914 on alternate days instead of three times per week, and so received 182 tappings instead of 156. The trees were rested during the wintering season in 1913 only.

Twenty-five trees were tapped in each of the rows 78 A and 78 B, 39 in 82 B, and 23 in 80 C. The number in 80 C was reduced by loss of a tree through disease to 22 at the end of 1915.

In June, 1912, the average girths of the tapped trees were, in inches: 82 B, 25·3; 78 A, 25; 78 B, 25; in December, 1913, the average girths were: 80 C, 29·3; 78 A, 29; 78 B, 30·2; and in December, 1918, 80 C, 39·0; 78 A, 41·5; 78 B, 38·8.

The yield per tree in grams, and the number of tappings per annum, are given in the following table:—

	82 B, 80 C.		78 A.		78 B.	
	Tappings No.	Yield. Grams.	Tappings No.	Yield. Grams.	Tappings No.	Yield. Grams.
1912 (half) ..	85 ..	668 ..	52 ..	635 ..	27 ..	305
1913 ..	139 ..	1,053 ..	86 ..	1,209 ..	46 ..	723
1914 ..	182 ..	1,936 ..	105 ..	1,674 ..	52 ..	944
1915 ..	157 ..	2,058 ..	104 ..	1,830 ..	52 ..	915
1916 ..	154 ..	2,199 ..	105 ..	2,135 ..	52 ..	880
1917 ..	153 ..	2,697 ..	104 ..	2,257 ..	52 ..	1,068
1918 (half) ..	76 ..	1,092 ..	49 ..	870 ..	27 ..	351
Total ..	946	11,703	605	10,620	308	5,186
Total, 1914-18	722	9,982	467	8,776	235	4,158

The yields in pounds are:—

	82 B, 80 C. lb.	78 A. lb.	78 B. lb.
1912 (half) ..	1·5 ..	1·4 ..	0·7
1913	2·3 ..	2·7 ..	1·6
1914	4·3 ..	3·7 ..	2·1
1915	4·5 ..	4·0 ..	2·0
1916	4·8 ..	4·7 ..	1·9
1917	5·9 ..	5·0 ..	2·4
1918 (half) ..	2·4 ..	1·9 ..	0·8
Total ..	25·8	23·4	11·4
Total, 1914–18 ..	22	19·3	9·2

The ratios of the yields of the three groups from the beginning of the experiment are 100 : 90·7 : 44·3; and from 1914,

when the direction of the cuts was rectified, 100 : 87·9 : 41·7 Consequently, the twice a week tapping gave from 10 to 12 per cent. less than the three times a week tapping, while the once per week tapping gave rather less than half the twice per week tapping.

The *yields per tree per tapping* for the whole period are 12·4, 17·6, and 16·8 grams respectively. Thus, the twice per week tapping yielded at each tapping 42 per cent. more than the three times a week tapping. On the other hand, the once a week tapping yielded at each tapping rather less than the twice a week tapping.

The following table gives the *yield per tree per tapping* in grams for each year of the experiment.

	82 B, 80 C. Grams.	78 A. Grams.	78 B. Grams.
1912	7·9 ..	12·2 ..	11·3
1913	7·6 ..	14·1 ..	15·7
1914	10·6 ..	15·9 ..	18·2
1915	13·1 ..	17·6 ..	17·6
1916	14·3 ..	20·3 ..	16·9
1917	17·6 ..	21·8 ..	20·5
1918	14·4 ..	17·8 ..	13·0

The above figures are, of course, subject to fluctuations due to weather conditions and the position of the cut during the year. The decrease in 1918 is due to the fact that the tapping was carried on only in the first six months, *i.e.*, during the period when the yield is lowest, and the effect was accentuated by an exceptional drought, no rain falling in February.

In rows 82 B and 80 C, tapped three times per week, the tapping throughout was on virgin bark. Four and a half thirds were tapped. The half third was tapped from July, 1912, to December 5, 1912, 71 tappings, the yield being 530 grams. [The exact length tapped is doubtful, but was no doubt about 6 inches.] The next third was tapped from December, 1912, to December 9, 1913, 153 tappings, and yielded 1,191 grams. Tapping was then transferred to row 80 C, the first section of which was tapped from January, 1914, to the end of March, 1915, 223 tappings, the yield being 2,346 grams. The second section of 80 C was tapped from April, 1915, to December, 1916, 258 tappings, the yield being 3,576 grams. The third section was tapped from December, 1916, to July, 1918, 241 tappings, the yield being 4,060 grams.

Row 78 A, tapped twice per week, had, as previously stated, been tapped on half the circumference from January to December, 1910. When taking into tapping on July 1, 1912, the first third which was tapped was on virgin bark; it was

tapped from July, 1912, to February 14, 1914, 152 tappings, and yielded 2,031 grams per tree. The second section was tapped from February, 1914, to the end of March, 1916, 221 tappings, and yielded 3,783 grams per tree. As half the circumference had been tapped from January to December, 1910, tapping on this third was partly on renewed bark, only four years old. The third section was tapped from April, 1916, to the end of June, 1918, 232 tappings, the yield per tree being 4,806 grams; this tapping was on renewed bark, six and a quarter years old, at least as regards the basal cuts. About 1½ inches of bark remained untapped on the third section when tapping was stopped.

Row 78 B, tapped once per week, had previously been tapped similarly to 78 A. The first third tapped in the present experiment was on virgin bark; it was tapped from July 1, 1912, to the end of October, 1915, 168 tappings, the yield per tree being 2,772 grams. The second third was tapped from November, 1915, to the end of June, 1918, 140 tappings, the yield per tree being 2,414 grams. About 4 inches of bark remained untapped on the second section when the experiment was brought to a conclusion. As half the tree had been previously tapped, the tapping on the second third was partly on renewed bark 5¾ years old.

The *number of cuts to the inch* has varied considerably, in accordance with the general improvement which has taken place in the standard of tapping during recent years. In 1912 apparently about 12 cuts to the inch was accepted, but in 1915 the number was fixed at 20. The average number of cuts to the inch on the three rows of the present experiment during the six years has been 18, 18, and 15, respectively. Thus, thicker strips have been removed in the case of the row tapped once per week.

The *yields per vertical inch of tapped surface* are 54·6, 77, and 65 grams, respectively.

The *percentages of scrap* for the six years were 11·8, 11·8, and 16·9, respectively. The percentages for each year since 1914 are given in the following table:—

	82 B, 80 C. Per Cent.	78 A. Per Cent.	78 B. Per Cent.
1914	10·2 ..	10·5 ..	15·0
1915	10·3 ..	11·3 ..	17·9
1916	11·5 ..	8·8 ..	15·4
1917	10·3 ..	12·4 ..	18·2
1918	12·4 ..	16·9 ..	27·8

Except in 1916, the percentage of scrap of the row tapped twice a week has been slightly higher than that of the row tapped three times per week. That of the row tapped once

per week is always considerably higher. It will be noted that the percentage of scrap in 1918 is higher than in previous years. This is partly due to the drought in February of that year, but also to the fact that the trees were only tapped for the first six months, *i.e.*, during the drier period and when the trees are wintering. Examination of the results of previous years gives the following percentages :—

	80 C. Per Cent.	78 A. Per Cent.	78 B. Per Cent.
1916 January–June ..	12·3 ..	9·6 ..	17·0
July–December ..	10·7 ..	8·1 ..	14·1
1917 January–June ..	12·1 ..	13·3 ..	18·9
July–December ..	8·9 ..	11·9 ..	17·8
1918 January–June ..	12·4 ..	16·9 ..	27·8

Evidently the percentage of scrap is usually higher during the first half of the year than during the second half.

The average *percentages of rubber in the latex* collected is shown in the following table for 1917 only. They are based on the actual measurement of the latex collected after transport to the factory and the weight of dry rubber obtained (excluding scrap). Hence they are not of much value as a basis for conclusions concerning the condition of the latex in the tree, and the numerous variations are no doubt due in part to evaporation after collection :—

1917.	80 C. Per Cent.	78 A. Per Cent.	78 B. Per Cent.	Rainfall. Inches.	Wet Days.
January ..	20 ..	36 ..	34 ..	5·83 ..	12
February ..	34 ..	40 ..	62 ..	6·12 ..	13
March ..	30 ..	39·5 ..	36 ..	6·49 ..	17
April ..	34 ..	42 ..	52 ..	2·15 ..	6
May ..	36 ..	48 ..	34 ..	4·63 ..	3
June ..	31 ..	42 ..	38 ..	10·24 ..	14
July ..	33 ..	39 ..	43 ..	6·40 ..	13
August ..	30 ..	37 ..	31 ..	9·95 ..	15
September ..	28 ..	37 ..	40 ..	15·24 ..	19
October ..	27 ..	32 ..	45 ..	9·63 ..	13
November ..	31 ..	36 ..	40 ..	16·49 ..	18
December ..	28 ..	32 ..	39 ..	6·49 ..	13

In general, the above figures support the conclusion founded on other experiments, that the percentage of rubber in the latex decreases with more frequent tapping.

Summary.

1. The yield per tapping in twice per week tapping is greater than that in thrice per week tapping.

2. Tapping once per week does not give a greater yield per tapping than tapping twice per week.

3. The greatest quantity of rubber is obtained by the most frequent tapping, but the total yield obtained by tapping three times a week has been only about 12 per cent. greater than that obtained by tapping twice per week in the present experiments.

4. The percentage of rubber in the latex increases as the time interval is increased.

5. The difference between the percentages of scrap obtained in tapping twice per week and three times a week respectively is very small.

Total Rubber per Month, in Grams.

[A thick transverse line denotes the completion of tapping on a section.]

1912.	82 B. No. of Tappings.	82 B. Yield.	78 A. No. of Tappings.	78 A. Yield.	78 B. No. of Tappings.	78 B. Yield.	Rainfall. Inches.	Wet Days.
July	13	3459	9	1671	5	614	6·72	9
August	15	3312	8	2332	4	681	4·63	14
September	15	3174	9	2215	4	623	2·50	8
October	13	5543	9	2968	5	1638	10·93	23
November	15	5198	8	3004	4	1161	9·67	19
December	14	5385	9	3693	5	2904	14·84	17
1913.								
January	13	4235	8	2938	4	1366	22·59	21
February	8	2870	4	1279	2	921	0·91	5
March	—	—	—	—	—	—	3·99	5
April	13	1994	9	1120	5	495	9·26	15
May	16	4024	8	2170	4	631	4·43	6
June	15	3428	9	2939	4	993	7·21	12
July	14	4287	8	3333	5	1342	5·54	15
August	14	3472	8	2879	4	1493	5·20	13
September	15	4533	9	4174	5	3188	2·22	8
October	14	6271	8	3702	4	2275	32·03	21
November	13	4367	7	3027	4	2449	11·14	17
December	4	1568	8	2672	5	2912	16·18	18

1914.	80 C. No. of Tappings.	80 C. Yield.	78 A. No. of Tappings.	78 A. Yield.	78 B. No. of Tappings.	78 B. Yield.	Rainfall. Inches.	Wet Days.
January	15	4281	9	2859	4	2586	2·20	8
February	14	4222	8	2390	4	2354	0·33	3
March	15	3121	9	1877	5	871	4·56	10
April	15	3682	9	3110	4	1432	5·87	11
May	16	4118	8	3546	4	2129	4·83	10
June	15	4026	9	3731	5	1545	12·47	27
July	15	3178	9	3685	4	1981	5·17	17
August	16	3103	9	2772	4	1565	5·71	11
September	15	3251	8	3556	5	1916	7·60	16
October	15	3730	9	4032	4	1824	11·87	25
November	15	3573	9	4583	4	2699	7·41	19
December	16	4238	9	5718	5	2704	14·70	21

1915.	80 C. No. of Tappings.	80 C. Yield.	78 A. No. of Tappings.	78 A. Yield.	78 B. No. of Tappings.	78 B. Yield.	Rainfall. Inches.	Wet Days.
January	14	4031	8	5206	4	2638	9·40	14
February	13	2924	8	3567	4	1834	4·17	3
March	14	2471	9	2598	5	1351	1·85	6
April	13	4832	9	4676	4	1725	5·57	9
May	13	3657	9	3755	4	1635	2·76	8
June	12	3481	8	3678	5	2282	9·10	13
July	13	3864	9	3803	4	1953	12·84	20
August	13	4580	9	3669	5	2743	5·10	13
September	13	3905	9	3061	4	2152	10·07	16
October	13	4607	8	3520	4	1672	5·88	10
November	13	4417	9	3672	5	1054	12·21	27
December	13	4560	9	4533	4	1826	8·64	14
1916.								
January	12	5691	9	6537	5	2554	0·49	2
February	12	3649	8	2717	4	1303	0·00	0
March	14	3066	9	2402	4	966	10·64	13
April	12	3732	8	2437	4	1597	8·10	9
May	14	4606	9	4531	5	1845	7·30	10
June	13	3390	9	5246	4	1497	13·67	20
July	13	2623	9	4810	4	1973	12·53	26
August	13	3630	9	3695	5	2010	4·69	16
September	13	4026	9	4213	4	1664	6·67	16
October	13	3738	9	4408	5	1973	6·77	19
November	13	4258	9	6341	4	2051	9·16	14
December	12	5971	8	6028	4	2575	4·04	10
1917.								
January	13	4381	9	4641	5	2521	5·83	12
February	12	4554	8	3369	4	2620	6·12	13
March	13	3197	8	2524	4	1369	6·49	17
April	13	4073	9	2483	4	1209	2·15	6
May	12	4342	9	3408	5	1173	4·63	3
June	13	4407	8	3821	4	1293	10·24	14
July	13	5803	9	4653	5	2771	6·20	13
August	14	5876	9	4897	4	1712	9·95	15
September	12	5563	8	6214	4	2749	15·24	19
October	14	6288	9	7399	5	4079	9·63	13
November	11	5650	9	7489	4	2933	16·49	18
December	13	5194	9	5784	4	2270	6·49	13
1918.								
January	13	5039	9	6425	5	2341	4·53	13
February	12	4417	8	3436	4	1238	0·00	0
March	13	1928	8	1592	4	738	3·96	5
April	13	3830	9	2983	5	1507	4·04	10
May	13	4758	7	3628	5	1554	13·23	16
June	12	4044	8	3675	4	1396	10·04	17

Note.—Row 82 B, 39 trees. Row 80 C, 23 trees, January, 1914–December, 1915; 22 trees, January, 1916–June, 1918. Rows 78 A, 78 B, 25 trees each.

T. PETCH.

November, 1918.